



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/584,700

05/10/2007

Wouter Eyckmans

04-1057-A

8011

20306

7590

09/21/2009

MCDONNELL BOEHNEN HULBERT & BERGHOFF LLP
300 S. WACKER DRIVE
32ND FLOOR
CHICAGO, IL 60606

EXAMINER

JOHNSON, RYAN

ART UNIT

PAPER NUMBER

2817

MAIL DATE

DELIVERY MODE

09/21/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,700	Applicant(s) EYCKMANS ET AL.	
	Examiner Ryan J. Johnson	Art Unit 2817	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5,7,13,21-25,27-30 and 32 is/are rejected.
- 7) ☒ Claim(s) 3,4,6,8-12,14-20,26 and 31 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>6/22/06</u> . | 6) <input checked="" type="checkbox"/> Other: <u>See Continuation Sheet</u> . |

Continuation of Attachment(s) 6). Other: copies of NPL citations 3 and 4 on IDS 6/22/06.

DETAILED ACTION

Priority

1. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Application No. 60/533,323, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Specifically, the prior-filed application is directed to a device allowing magnetic property interaction, but does not explicitly disclose any devices capable of generating an oscillating signal.

2. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in the European Patent Office on December 24, 2003. It is noted, however, that applicant has not filed a certified copy of the EPO application as required by 35 U.S.C. 119(b).

Information Disclosure Statement

3. The information disclosure statement filed June 22, 2006 lists NPL references not received (Kiselev et al. and Rippard et al.). However, said NPL references have been retrieved, considered, and placed in the application file.

Drawings

4. The drawings are objected to because:
- a. Fig.6 requires additional labeling in order to distinguish each Figure from another (i.e. labels of Fig.6(a), (b), and (c) are required).
 - b. Claimed component 202 (magnetic excitable layer) must be labeled in Fig.6(c) (i.e. device shown on right of Fig.6).
 - c. The Figures are blurry and the individual layers are difficult to see on Figs. 3, 6, 7, 8, and 9-15. Clearer figures are required.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

Art Unit: 2817

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities: Fig.4 is not referenced in the specification (see page 11). Only two figures of Fig.6 are discussed ("Fig.6a" and "Fig.6ab"). It is also unclear which specific Figures are being discussed.

Appropriate correction is required.

Claim Objections

6. Claim 17 is objected to because of the following informalities: "the Surface Acoustic Wave generating means" lacks antecedent basis. The Examiner suggests amending claim 17 to require it to be dependent upon claim 16. Appropriate correction is required.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 5, 7, 13, 21-25, 27-30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiselev et al. ("Microwave Oscillations of a Nanomagnet Driven by a Spin-polarized Current", as cited by Applicant and hereinafter "Kiselev") in

Art Unit: 2817

view of Lagae et al. ("On-chip Manipulation and Magnetization Assessment of Magnetic Bead Ensembles by Integrated Spin-Value Sensors", hereinafter "Lagae").

9. Due to the use of "a means for" and "an integrated means", rather than "means for...", the Examiner is not interpreting claim 1 under 112(6). If the claim is to be under 112(6), the Examiner suggests using "means for..." language rather than "a means for" or "an integrated means". The Examiner is therefore interpreting claim 1 under the broadest reasonable interpretation.

10. Regarding independent claim 1, Kiselev discloses a device for generating an oscillating signal (see Fig.1), the device comprising:

a means for providing a current of spin polarized charge carriers (the "fixed" Co layer, which produces a spin-polarized current for the "free" Co layer (see page 380, second column, lines 1-3);

a magnetic excitable layer (the "free" Co layer) adapted for receiving said current of spin polarized charge carriers thus generating an oscillating signal with a frequency V_{osc} (see page 380, second column, first paragraph); and

a means (a magnetic field generator; see page 380, second column, lines 10-13), different from said means for providing a current of spin polarized charge carriers (the magnetic field generation is different than the "fixed" layer providing spin-polarized current), for interacting with said magnetic excitable layer to thereby select said oscillation frequency (see page 380, second column, lines 10-13).

11. Regarding claims 2, 29 and 32, Kiselev discloses a method for generating oscillations, the method comprising:

Art Unit: 2817

providing a current of spin polarized charge carriers (via the "fixed" Co layer; see page 380, second column, lines 1-3), thus generating an oscillating signal with an oscillation frequency ν_{osc} by interaction between said current of spin polarized charge carriers and a magnetic excitable layer (a frequency is generated by interactions between the spin polarized current generated by the "fixed" Co layer and the "free", i.e. magnetic excitable, layer; see page 380, second column, lines 10-13);

controllably tuning said oscillation frequency by inducing an interaction between a means, different from said means for providing a current of spin polarized charge carriers, and said magnetic excitable layer (see Fig.1(e), where the frequency of the oscillator is tuned via the magnetic field generator, different from the "fixed" layer); and

measuring an excitation caused by said spin polarized charge carriers (see Fig.1(a) and page 380, second column, paragraph 3, which discusses measuring the microwave power by use of a heterodyne mixer).

12. The only difference between the recited invention of claims 1, 29, and 32 is that the means to tune or determine the oscillation frequency (different than the means for providing spin-polarized current) is not explicitly disclosed as integrated. In other words, the magnetic field generator used to tune the oscillator (see Fig.1(e)) is not explicitly disclosed as "integrated". Lagae discloses an integrated system (see Fig.1), where the magnetic field generator is integrated with the overall circuit and provides a magnetic field to a sensor by use of two current lines on each side of the sensor (see Fig.1, abstract). One of skill in the art would have recognized the benefit of providing an integrated magnetic field generator as a reduction of space and ease of manufacture.

Art Unit: 2817

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have provided the integrated magnetic field generator of Lagae with the microwave oscillator of Kiselev in order to have provided the benefits of reduced size and ease of manufacture.

13. Regarding claims 5 and 30, Kiselev discloses the interacting performing a magnetostatic interaction (i.e. an application of a static magnetic field; see page 380, second column, lines 10-13).

14. Regarding claim 7, Kiselev discloses a means for generating a magnetic bias field to bias the magnetic excitable layer (see page 380, second column, lines 10-13, where a static magnetic field is generated)

15. Regarding claim 13, in the combination of Kiselev and Lagae, the magnetic field generator of Lagae comprises an interacting layer (i.e. "current lines" of Fig.1) that is coupled via magneto-statically to the magnetic excitable layer (i.e. the magnetic field generator of Lagae generates a static magnetic field required by Kiselev, thus is magnetostatically coupled to the "free" layer).

16. Regarding claim 21, Kiselev discloses the means for providing current... abutting on the magnetic excitable layer (see Fig.1(a) and comprising an electrode (top/bottom Copper layer), a spin polarization means (the "fixed" Co layer) and a current confinement structure ("SiO₂ insulator").

Art Unit: 2817

17. Regarding claim 22, Kiselev discloses the means for providing spin polarized charge carriers as a “fixed” layer (which by definition must have a constant magnetic polarization; see page 380, second column, lines 1-3).

18. Regarding claim 23, Kiselev discloses the fixed and excitable layers separated by an interlayer (middle copper layer between the free and fixed layers) to magnetically separate both layers (the middle layer is composed of copper, which magnetically separates the layers).

19. Regarding claims 24, 25, and 27, Kiselev discloses a readout structure (bias structure, swept signal generator, mixer, filter, diode detector, ect; see Fig.1a) that measures the excitation caused by the spin polarized current passing through the magnetic excitable layer (in the form of the microwave frequency; see page 380, column 2, third paragraph), magneto-resistance generated by the fixed and free layers (see Fig.1(c)), and resistance change (i.e. differential resistance, see Fig.1(b)); between two electrodes in electrical contact with said excitable layer (i.e. between each Cu electrode electrically coupled to the free layer).

20. Regarding claim 28, since the circuit of Fig.1a is capable of measuring a change in resistance, the circuit of Fig.1a must also be capable of measuring a change of resistance in a lateral geometry.

Allowable Subject Matter

21. Claims 3, 4, 6, 8-12, 14-20, 26, and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2817

22. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not explicitly disclose the interacting comprising any of: inducing stress, applying an electric field over a ferromagnetic semiconductor layer, a piezoelectric layer, an antiferromagnetic layer, and a SAW generator. The prior art also does not explicitly disclose the magnetic bias field generator as an antiferromagnetic layer or an element of ferromagnetic material. The prior art also does not explicitly disclose a readout structure that comprises a piezoelectric layer that converts precessional movement of the excitable layer into an electrical signal.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sato et al. (U.S. Publication No. 2005/0023938) discloses a high frequency oscillation element comprising fixed and free layers.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J. Johnson whose telephone number is (571)270-1264. The examiner can normally be reached on Monday - Friday, 9:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert J. Pascal can be reached on 571-272-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2817

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. J. J./
Examiner, Art Unit 2817

/Robert Pascal/
Supervisory Patent Examiner, Art Unit 2817